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- C. establishing a distribution set of probability distributions, including at least one distribution, associating hypothetical reaction values with corresponding probabilities for each genotype of interest at the locus;
- D. applying the first reaction value to each pertinent probability distribution to determine a measure of a conditional probability of each genotype of interest at the locus; and
- E. determining the genotype based on the data obtained from step (D).

76. (New) A method according to claim 75, wherein the distribution set includes a plurality of probability distributions for a corresponding plurality of genotypes of interest.

77. (New) A method, according to claim 75, further comprising:

- (i) reacting the material at the locus to produce a second reaction value independently indicative of the presence of a second allele at the locus;
- (ii) forming a second data set including the second reaction value; and
- (iii) applying the first and second reaction values to each pertinent distribution to determine a measure of the conditional probability of each genotype at the locus.

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78. (New) A method according to claim 76, further comprising:

- (i) reacting the material at the locus to produce a second reaction value;
- (ii) applying the first and second reaction values to each pertinent distribution to determine the probability of each genotype at the locus; and
- (iii) applying the first and second reaction values to each pertinent distribution to determine a measure of the conditional probability of each genotype at the locus.

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cont.

79. (New) A method according to claim 77, wherein each probability distribution associates a hypothetical pair of first and second reaction values with a single probability of each genotype of interest.

80. (New) A method according to claim 75, wherein:

step (B) includes the step of including in the data set other reaction values obtained under conditions comparable to those under which the first reaction value was produced; and

step (C) includes the step of using the reaction values in the data set to establish the probability distributions;

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the method further comprising:

performing steps (D) and (E) with respect to each of the reaction values.

81. (New) A method, according to claim 80, of determining the genotype at a locus within genetic material obtained from each of a plurality of samples, the method further comprising:

D
cont.

- (i) performing step (A) with respect to the locus of material obtained from each sample;
- (ii) in step (B), including in the data set reaction values obtained from each sample.

82. (New) A method according to claim 80, of determining the genotype of selected loci within genetic material obtained from a sample, the method further comprising:

- (i) performing step (A) at each of the selected loci;
- (ii) in step (B), including in the data set reaction values obtained from each of the selected loci.

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83. (New) A method according to claim 80, wherein step (C) includes:

- (i) establishing a set of initial probability distributions that associate hypothetical reaction values with corresponding probabilities for each genotype of interest at the locus;
- (ii) using the initial probability distributions to determine measures of the initial conditional probability for each genotype at the locus; and
- (iii) using the results of step (ii) to modify the initial probability distributions, so that the modified distributions more accurately reflect the reaction values in the data set.

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CD54

84. (New) A method according to claim 83, wherein step (C) further includes:

- (iv) repeating steps (i) through (iii) a desired number of times.

85. (New) A method according to claim 75, wherein step (E) further includes the step of calculating a confidence score, associated with the genotype being determined, based on data obtained from step (D).

86. (New) A method according to claim 80, wherein step (E) further includes the step of calculating a confidence score, associated with the genotype being determined, based on data from step (D), the method further comprising:

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(F) determining whether a significant downward trend in confidence scores has occurred, and, in such event, entering an alarm condition.

87. (New) A method according to claim 75, wherein each allele is a single specific nucleotide.

88. (New) A method according to claim 75, wherein each allele consists of at least two specific nucleotides.

89. (New) A method according to claim 75, wherein each allele is defined at least in part by its length in nucleotides.

90. (New) A method according to claim 75, wherein each allele is defined by one of the presence and absence of at least one restriction site.

91. (New) A method according to claim 78, wherein step (B) includes the step of including in the data set reaction values from prior tests at the locus obtained under comparable conditions.